Treatment of

Intestinal Toxemias, Infantile Diarrhea, Diabetes and Local Infections

with

Culture of the Bacillus Bulgaricus

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Treatment of

Intestinal Toxemias, Infantile Diarrhea Diabetes and Local Infections

"Harmful microbes may be displaced by those which have been proven beneficial."—METCHNIKOFF.

HISTORIC

The observations of Metchnikoff and other bacteriologists on the antagonism of lactic acid bacilli to putrefactive organisms in the intestine have opened up a new method of treatment which is constantly gaining in popularity. The fact that intestinal toxemia is considered so potent a factor in the causation of many diseases has encouraged the belief that by introducing cultures of lactic acid bacilli into the intestine it would be possible to arrest the growth of putrefactive and other pathogenic bacteria.

It was found by Metchnikoff (THE PROLONGATION OF LIFE, 1908, P. 961) that the Bacillus bulgaricus, first isolated and described by Grigoroff (REVUE MED. DE LA SUISSE ROMANDE, 1905, XXV) in Massol's laboratory at Geneva, exerts an antagonistic action against the growth of putrefactive bacteria by the large amount of acid which it produces.

Metchnikoff further discovered that the bacteria which cause putrefaction will not live in the presence of the Bacillus bulgaricus, which he found is the only lactic acid bacillus known that will survive ingestion, reach the large intestine and there continue to live, creating lactic acid and thus displacing the putrefactive organisms.

THERAPEUTIC USES

In recent years, medical literature contains many contributions to the subject of the Bacillus bulgaricus and the rationale of its therapeutic use and action in certain intestinal diseases of infants and adults, as suggested and demonstrated by Tissier (COMPT. REND. SOC. DE BIOL., 1906, LX.) and now established in the hands of many American physicians.

The Bulgarian culture has also proved of value by local application as an agent to inhibit putrefactive processes in body cavities, notably the middle ear, nasal tract, vagina and uterus.

CULTURE OF THE BACILLUS BULGARICUS is indicated in the treatment of intestinal toxemias due to deficient gastric digestion, abnormal alkaline putrefaction, indicanuria, chronic constipation of children, toxic diarrhea of infants, mucous colitis, typhoid fever, rheumatic conditions, arteriosclerosis and diabetes; also in otitis media, atrophic rhinitis, leukorrhea, vulvovaginitis, etc.

DIRECTIONS FOR USE

METHOD OF ADMINISTRATION

The simplest way to take the culture is to swallow it directly from the vial, which previously should have been shaken in order to suspend any of the deposited bacilli; or, the culture may be poured into a small glass containing a little water and sugar, and a dash of lemon, orange or grapefruit juice may be added if this renders it more agreeable. SUGAR OUGHT NOT TO BE ADDED IF PA-

TIENT IS A DIABETIC. For infants and children, the culture may be added to a small quantity of milk.

In treating atrophic rhinitis, otitis media, leukorrhea, etc., the culture may be used in the form of a spray or as a local application.

DOSAGE

The contents of three or more vials daily are usually employed to obtain acclimation of the bacilli in the alimentary tract. In acute affections, such as toxic diarrheas of infants or intestinal toxemias of adults, the contents of one or more vials is given every 2 or 3 hours until improvement occurs; then the culture should be administered three or four times daily before feedings until all toxic symptoms have disappeared.

NO UNTOWARD EFFECTS HAVE BEEN OBSERVED following the administration of large amounts of this culture but, according to Smiley (THE JOURNAL A. M. A., SEPTEMBER 18, 1915, P. 1025), its continued use in conditions in which there is marked anemia, cachexia or emaciation may aggravate the already existing acidosis.

For the treatment of suppurative conditions of the various body cavities, the culture should be applied one or more times daily until improvement occurs and then the local application continued at longer intervals until a cure is effected.

DIET

Proteins must be reduced to a reasonable minimum, and, if necessary, albuminous foods may be entirely excluded and farinaceous foods substituted—except in cases of diabetes. The lactic acid furnished by the action of the

Bacillus bulgaricus on the carbohydrates in farinaceous foods inhibits putrefaction of albuminous food substances in the intestine.

From a long series of physiologic and calorimetric tests, it would seem that the majority of people consume much more protein food than is necessary to maintain health and muscular efficiency; and the amount of protein food daily ingested must be reduced very materially in one suffering from intestinal putrefaction.

SUGAR IN SOME FORM IS ESSENTIAL to the proper growth of the Bacillus bulgaricus. The use of carbohydrate foods with only a moderate amount of protein (meats) and the elimination of red meats from the diet will aid the acclimation of the Bacillus bulgaricus within the intestine and thus inhibit putrefactive changes in the intestinal tract.

One vial of the Lederle CULTURE OF THE BACILLUS BULGARICUS contains large numbers of live Bulgarian bacilli in 5 c.c. of fluid, which conveys about one grain of total sugars. In cases in which sugars or carbohydrates are under definite restriction and regulation, this quantity of sugar obviously is negligible. In the great majority of cases in which the culture is used, the liberal use of sweets, farinaceous, vegetable and milk foods is permitted.

EXERCISE

In adults, the various body-bending exercises, with deep inspiratory and expiratory chest movements, bathing exercises, walking, golf, tennis, Indian club and dumbbell exercises, boxing and fencing are to be recommended to promote normal intestinal digestion and prevent formation of toxic decomposition products.

RESULTS

After a few days' internal administration of the Bacillus bulgaricus, it is remarkable how soon the stools lose their putrid odor, the tongue becomes cleaner and the breath sweetened. The signs of auto-intoxication slowly disappear and, therefore, for curative purposes it is advisable to continue the use of the culture for some time after the acute condition has subsided.

CULTURE OF THE BACILLUS BULGARICUS has also been applied with some degree of success in the treatment of various suppurative conditions, such as otitis media, atrophic rhinitis, leukorrhea, etc.

THE LEDERLE CULTURE

In the Lederle Antitoxin Laboratories, the Bacillus bulgaricus is grown on a modified Cohendy medium containing extractives of beef and of milk, together with carbohydrates and mineral salts, all of which are found in the food of man. The fact that the Bulgarian bacillus will grow luxuriantly in such a medium suggested to Cohendy (Compt. Rend. de la Soc. de Biol., 1906, lx. 602), the idea of the acclimation of the bacilli in the alimentary tract—adaptation to the mixed diet of man.

The cloudiness of the Lederle CULTURE OF THE BACILLUS BULGARICUS is due to the large numbers of Bulgarian bacilli which are in suspension in the fluid. When the culture stands at rest, the bacilli settle and form a deposit. This cloudiness is evidence of luxuriant growth and does not indicate deterioration, for the deposited bacteria are not dead. The Lederle culture contains the Bulgarian bacillus in pure culture, free from other organisms, and is efficient for breast-fed infants, for the milk-and-cereal-fed child, as well as for the adult.

POTENCY

The potency of the Lederle **CULTURE OF THE BACILLUS BULGARICUS** has been established by the report of the Council on Pharmacy and Chemistry (THE JOURNAL A. M. A., DEC. 6, 1913, P. 2084), of which the following is an excerpt: "The frequently made assertions that the lactic acid ferment preparations on the market are worthless, made it important to determine the quality of those admitted to New and Nonofficial Remedies. Three samples of Massolin* were examined. They contained pure cultures of Bulgarian bacilli in liquid form. The action was very prompt, more so than any of the other samples of commercial articles examined. Microscopic examination showed the bacilli to be in pure culture."

IMPORTANT

This culture should be kept in a cold place—refrigerator or ice-box—the required number of vials for a single dose being taken out and the remainder kept on ice. Before removing the cork from a vial, the **VIAL SHOULD BE WELL SHAKEN** in order to suspend any bacteria that may have settled out on standing.

The culture should be used prior to the date stamped on the package, and it is essential that the culture be **KEPT IN A REFRIGERATOR OR ICE-BOX** at a temperature **BELOW 60° F.** If exposed to room temperature, the viability of the culture is more quickly destroyed.

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* At the time this report was made, the Lederle CULTURE OF THE BACILLUS BULGARICUS was marketed under the name of Massolin.

CLINICAL REPORTS

INFANTILE DIARRHEA

Clock (THE JOURNAL A. M. A., JUNE 29, 1912, P. 2017) introduced the Bacillus bulgaricus into the intestines to arrest the growth of putrefactive and other bacteria. Excellent results were reported in a series of 22 cases of infantile diarrhea. Decided improvement occurred in every case within 24 hours after beginning treatment, and this was followed by a steady increase in weight and restoration to health. No other therapeutic measures were used. He states: "One of the great advantages of this method of treatment is that it is unattended with any untoward effect. * * * The infants varied in age from 5 weeks to 10 months. Some of these cases were of the most severe type of gastro-intestinal disturbance, but in every case a decidedly effective and happy result followed."

"The gain in weight which followed in every case under the implantation method of treatment was probably due to the fact that, after the putrefactive process had been arrested by the action of the Bacillus bulgaricus, the digestive tract was able to take care of the food which previously had caused indigestion; hence, the food began to satisfy the caloric needs of the infant and nutrition thus suffered no loss. * * * After the stools became normal, the culture was administered three times daily for a period of one or two weeks."

During the summer months of 1912, Clock (THE JOURNAL A. M. A., JULY 19, 1913, P. 164) demonstrated the value of this method of treatment in the out-patient department of the Babies' Hospital of the City of New York. Every infant suffering from diarrhea, without selection, was placed upon this treatment. Altogether, 117 children thus affected were treated; of these, 116 recovered and one died, the death occurring in a case of severe enterocolitis which had persisted for two weeks prior to treatment. The ages of the patients ranged from six weeks to two and one-half years.

The striking thing about this method of treatment was, that in 74 babies the mode of feeding was not changed; that is, breast-fed babies were permitted to continue to nurse and the bottle-fed babies received their regular milk or cereal mixture as before. As a method of control, 43 of the little patients were placed upon the classical starvation diet of barley-water for twenty-four to forty-eight hours, after which small quantities of milk usually were allowed. Of the 32 patients on the starvation diet, 29 were given a preliminary dose of castor oil.

Within an average of 3.1 days, the color of the stools became normally yellow, while mucus and blood invariably disappeared on the second day. As a rule, vomiting ceased and fever subsided at the same time, while the appetite immediately improved.

The most striking feature of the treatment was the phenomenal gain in weight. This was most remarkable in those babies who were continued on the milk diet. Every one of the 74 patients thus treated, whether breast-fed or receiving milk or a mixture of milk and other foods, gained rapidly. The average gain in these patients was 1.2 ounces for the first twenty-four hours and 6.2 ounces at the end of the first week. The patients on the starvation diet also generally increased in weight, but they showed an average gain only of 0.2 ounce at the end of the first day and 1.7 ounces at the end of the week.

Clock is of the opinion that a starvation diet, accompanied by purgation, is productive of loss of weight and strength, and serves to prolong the course of the disease. He further believes that such a method of treatment can no longer be advocated in the treatment of infantile diarrhea after observing such striking results following the use of the Bulgarian bacillus in connection with milk feeding.

Editorially, the ARCHIVES OF PEDIATRICS FOR AUGUST, 1912, on page 561, states: "The treatment of the putrefactive diarrheas of summer by the use of lactic acid-producing bacteria to change the character of the intestinal flora and the reaction of the intestinal contents as advocated by Metchnikoff and his school, was tried in this country in 1907, 1908 and 1909, without much success. A number of observers reported series of cases in which the attempt had been made to implant a living culture of such organisms, but in which little of advantage seemed to have been gained. Whether the attempt was made by using ripened milk, or tablets supposed to contain the bacteria, or suspensions of cultures of such bacteria or growths in malt, the reports were not sufficiently favorable to bring the method into a general therapeutic application. Those who did use the bacteria seldom had the courage, in the face of the apparently negative results and the increasing illness of the children, to persist in most of their cases for the length of time declared necessary by the advocates of the method; and it was felt generally that those who had advocated the use of these bacterial preparations had been carried away by their enthusiasm."

"Recently an article by Clock (THE JOURNAL A. M. A., JUNE 29, 1912, P. 2017) has renewed the interest in the use of the Bulgarian bacillus in summer diarrhea, and has perhaps indicated what was the cause of failure in previous attempts in America. * * * Dr. Clock reported in detail 8 cases of a large series of cases, in which the only treatment was the administration of a pure culture of the Bacillus bulgaricus."

"The true criteria for judging the success of a treatment of diarrhea are the rapidity of the improvement in the general condition, the rapidity of the subsidence of fever, the rapidity of the return of stools to normal color and consistence, the maintenance of body weight or the rapid return to the previous weight. Judged by the first three of these criteria, the lactic acid bacillus treatment compares very favorably with previous methods; in the last it excels them. We commonly see as great a loss as 15 ounces a day in the ordinary case of diarrhea by the ordinary treatment. That such a loss contributes to the mortality percentage through weakened resistance is highly probable, and seems absolutely certain to anyone who has seen the difference in typhoid fever under starvation and under high calory diet and diarrhea under starvation and under a good diet plus the Bulgarian bacillus."

"The method of handling the putrefactive diarrheas of summer has in it much of promise, both from a rational and from an empiric standpoint. It requires the extended experience of many observers to finally establish its therapeutic value, but in view of the striking results which a number of physicians have obtained, using it as the sole remedy, such reports as may detail unfavorable results should not be taken too seriously unless their authors can demonstrate a consistent and thorough use of the bacilli."

Schwartz (MEDICAL RECORD, JANUARY 24, 1914, P. 159) reported favorable results in a series of cases of infantile diarrhea treated with cultures of the Bacillus bulgaricus. He states: "The agreeable results obtained by Clock in the vomiting and diarrhea of babies by administration of the Bacillus bulgaricus led me to try the treatment in a series of cases that came under my care during the months of July and August of the present year. There were 55 cases in all. The babies ranged in age from a few weeks up to two years. Sixteen were breast babies, 32 bottle and 7 breast and bottle. The results obtained were as follows: Forty-three of the children gained in weight outright; 2 lost; 3 gained and then later lost; and in 7 there was no change of weight recorded. In all cases, the temperature came down to the normal within one to three days."

Harrington (N. Y. STATE JOURNAL OF MEDICINE, FEBRUARY, 1912) found that the administration of cultures of the Bulgarian bacillus in cases of enterocolitis of infants always resulted in recovery, except in far advanced cases. Babies even only three weeks old were treated in this way. Besides the preliminary dose of castor oil, no drugs were given except lime water or calcium carbonate. Antiseptics are especially to be avoided as they counteract the growth of the lactic bacillus and annul the effect of the treatment. As for the diet, whey, diluted according to age, is best; later, milk is added in increasing amount. For older babies, barley water or other cereal water with milk sugar may be added. In breast babies the milk was usually continued from the first and the cultures given between the feedings. It was found unnecessary to use rectal or colon washings in conjunction with the lactic culture treatment.

Loving (TEXAS STATE JOURNAL OF MEDICINE, 1913) reports good results in cases of infantile diarrhea treated with cultures of Bacillus bulgaricus.

Berry (ARCHIVES OF PEDIATRICS, JULY, 1914) reported excellent results in 24 children suffering from summer diarrhea treated with cultures of Bacillus bulgaricus.

DIABETES

Several reports have appeared in the medical literature pertaining to the use of the Bulgarian bacillus in the treatment of diabetes. The influence of such treatment on the diabetic condition itself is questionable, but the fact that the intestinal condition in a patient suffering from diabetes may be corrected by this form of treatment obviously stamps it as a valuable therapeutic measure.

Horowitz (MEDICAL RECORD, JANUARY 25, 1913) obtained excellent results in 13 cases of diabetes by administration of the Bacillus bulgaricus. In this disease, he believes the action of the Bacillus bulgaricus to be twofold; namely, by correcting the auto-intoxication and, second, by slowing down the carbohydrate metabolism so that more carbohydrate is tolerated and only small amounts of sugar are formed and absorbed.

Beveridge (N. Y. MEDICAL JOURNAL, JULY 12, 1913, P. 70), in a series of 166 cases of diabetes, succeeding in reducing the sugar content of the urine from 7.9 per cent. to 0. In some of the cases, the urine continued sugar-free for some time; in other cases the sugar reappeared, but in small amounts. He states that: "The Bulgarian bacillus is not pathogenic toward man or the usual laboratory animals. No untoward effects have been observed following large amounts of this culture."

"The antiseptic and corrective power of the bacillus, by overcoming autointoxication and all conditions of intestinal putrefaction, is very marked. The action of this culture is never manifested unless the micro-organisms are viable when administered."

LOCAL INFECTIONS

Watson (British Medical Journal, December 21, 1912) used the culture by local application for treating mixed infections of the female genital tract.

He believes that while antiseptic treatment deals efficiently with the pathogenic micro-organisms, it also exterminates the natural protective flora of the vagina and thus weakens its resisting powers. The acid-forming bacillus of Döderlein is the accredited protector of the vagina, but the lactic acid bacillus seems a suitable substitute and the results of its use have justified his expectations.

After thoroughly disinfecting the parts (including curetting when necessary) all traces of disinfectant are removed and the lactic culture introduced into the vagina. At first the amount of discharge is increased, but it becomes completely altered in character. It is no longer purulent, but white and thin. The discharge should be removed daily by gentle swabbing with dry wool. In most favorable cases, the secretion becomes normal in a few days. In others, the treatment must be repeated weekly until the cure is complete; usually from 2 to 3 weeks will suffice.

Jeannin (China Medical Journal, February, 1913) used sterile gauze soaked in fresh cultures of the Bacillus bulgaricus for treating septic vulvovaginal sores. These lesions which are very rebellious to antiseptics, improve very rapidly in the treatment and the results obtained are described as truly marvelous. The author has seen large recto-vaginal fistulas disinfected and quickly healed.

Pouliot (REVUE PRAT D'OBSTET. ET DE GYNECOLOGIE, SEPTEMBER, 1912) regards local application of lactic acid bacilli as having a wide field of effectual action in accessible gynecological and obstetric lesions.

Curtis (MEDICAL RECORD, JULY 11, 1908) reported the results obtained by means of lactic acid bacilli cultures in nose, throat and ear work. He states: "Injections by means of a catheter into a profusely discharging frontal sinus have caused a diminution of the discharge, amounting to 90 per cent., after the second dose of a cubic centimeter of the culture, and this in a case of over a year's duration. In several instances of chronic ethmoiditis with profuse post-nasal discharge, the condition has been so relieved that the patient has asserted himself entirely cured."

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